



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,019	09/26/2003	Yehiel Gotkis	LAM2P437	7682

25920 7590 07/05/2005

MARTINE PENILLA & GENCARELLA, LLP  
710 LAKEWAY DRIVE  
SUITE 200  
SUNNYVALE, CA 94085

EXAMINER

JAGAN, MIRELLYS

ART UNIT PAPER NUMBER

2859

DATE MAILED: 07/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center"><b>Office Action Summary</b></p>	Application No. 10/672,019	Applicant(s) GOTKIS ET AL.	
	Examiner Mirellys Jagan	Art Unit 2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 April 2005.  
 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 13-26 is/are pending in the application.  
     4a) Of the above claim(s) 25 is/are withdrawn from consideration.  
 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
 6) ☒ Claim(s) 13-18, 22-24 and 26 is/are rejected.  
 7) ☒ Claim(s) 19-21 is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)<br>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)<br>3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____<br>5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)<br>6) <input type="checkbox"/> Other: _____ |
|---|--|

## DETAILED ACTION

### *Election/Restrictions*

1. Newly submitted claim 25 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claim 25 is directed to a species that was not originally claims since it is drawn to the embodiment shown in figure 2D, whereas the original claims were drawn to the embodiment of figure 2C.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 25 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### *Claim Objections*

2. Claim 19-21 are objected to because of the following informalities:

Claim 13 (see line 3) claims the embodiment shown in figure 2C, which has a wafer carrier that includes the sensor (106) (and the heater (102)) therein. Therefore, claim 19 is objected to since it claims that the heater (102) is positioned on an opposing side of the substrate from the sensor (106), i.e., as shown in figures 1, 2A, and 2B. Since claims 19-21 are drawn to a species that is different from the species of independent claim 13, claims 19-21 have not been further considered by the examiner.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 13-18, 22-24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,426,232 to Litvak in view of U.S. Patent 3,413,474 to Freeh.

Litvak discloses a system for monitoring the thickness of a metal layer on a wafer that is treated in a CMP system comprising:

a wafer carrier that supports the wafer during a planarization process in the system; and  
an optical system in the wafer carrier for measuring the thickness of the metal layer on the wafer during the planarization process using a reflection-detection technique, the optical system comprising an IR light source for delivering radiation and an IR sensor for detecting the reflected radiation from the layer; and

a computing device (controller) in communication with the sensor and configured to calculate a thickness of the metal layer based on the detected radiation (see figures 9 and 10; column 1, lines 28-40; column 5, lines 4-12; column 8, lines 8-9; column 10, line 17-column 11, line 3; and column 12, lines 29-51).

Litvak does not disclose the optical system using a radiation-detecting technique for measuring the thickness by providing an IR sensor configured to detect heat energy and an impulse heater for delivering a single defined IR heat energy pulse to the layer, and, accordingly, the computing device being configured to calculate the thickness of the layer based upon the

Art Unit: 2859

detected heat energy in relation to the defined heat pulse; wherein the sensor is positioned to detect the heat energy in a location different from the location where the heater delivers the defined heat energy pulse, an axis of the sensor and an axis of the heater are substantially orthogonal to the surface of the layer, the computing device stores a calibration curve and is configured to calculate a heat transfer rate from the detected heat energy and pulse, and having delay circuitry for delaying the detection for a period of time after the pulse.

Freeh discloses an optical system for measuring the thickness of a layer on a substrate using a radiation-detecting technique. The optical system comprises an IR sensor (8) configured to detect heat energy (9), an impulse heater (5) for delivering a defined IR heat energy pulse (4) to the layer, wherein the sensor is positioned to detect the heat energy in a location different from the location where the heater delivers the defined heat energy pulse, i.e., is spaced away from the impulse heater and detects the heat energy emanating that is different than the heat energy pulse is applied; an axis of the sensor and an axis of the heater are substantially orthogonal to the surface of the layer; the detected heat energy is correlated to the thickness of the layer based on 'calibration curves' (column 3, lines 6-15) relating the pulse and detected heat energy to the thickness; and that detection of the heat energy can be delayed for a period of time after delivering the pulse. Freeh discloses that it is known in the art to measure a thickness of a layer using a reflection-detecting technique, which uses an IR radiation source for irradiating the layer and a detector for measuring the reflected radiation and determining the thickness of the layer. Freeh teaches that his radiation-detecting technique is advantageous over the known techniques since it improves the accuracy for measuring coating thickness, has moderate costs, and is simple to use (see figure 3; column 1, lines 46-55; column 1, line 57-column 2, line 2; column 2, lines

Art Unit: 2859

16-26; column 2, line 58-column 3, line 5; column 3, lines 17-28; and column 3, line 71-column 4, line 19).

Referring to claims 13 and 22, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Litvak by replacing the optical system using a reflection-detecting technique with an optical system using a radiation-detecting technique, as taught by Freeh, in order to provide more accurate measurements in a simple manner. The sensor of the system of Litvak and Freeh is considered to 'minimize reception of a reflected heat energy pulse from the defined heat energy pulse' since it is spaced away from the impulse heater, and detects the heat energy emanating that is different from the heat energy pulse that is applied.

Furthermore, referring to claims 13, 17, and 26 respectively, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Litvak and Freeh by configuring the computing device to calculate the thickness of the layer based upon the detected heat energy in relation to the defined heat pulse in order to obtain thickness measurements using the radiation-detecting optical system; storing calibration curves (as taught by Freeh above) in the computing device in order to calculate the thickness; and including delay circuitry in the computing device in order to delay the detection (as taught by Freeh above).

With respect to claim 18, the specification refers to the 'heat transfer rate' as the "heat dissipation rate", and discloses that the heat dissipation rate is a function of the thickness of the layer, e.g., the thicker the layer the greater the heat dissipation rate (see page 9, lines 3-9). Therefore, it would have been obvious to one having ordinary skill in the art at the time the

Art Unit: 2859

invention was made to modify the system of Litvak and Freeh by configuring the computing device to calculate the heat transfer rate from the detected heat energy and heat pulse since Freeh teaches that the radiation detected by the sensor is a function of the thickness of the layer, i.e. teaches a heat dissipation rate is a function of the thickness of the layer (see column 3, lines 55-70).

### *Response to Arguments*

5. Applicant's arguments with respect to claims 1-26 have been considered but are moot in view of the new ground(s) of rejection.

### *Conclusion*

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents disclose a CMP system having thickness measuring means:

U.S. Patent 5,643,050 to Chen

U.S. Patent 6,159,073 to Wiswesser et al

U.S. Patent 6,224,460 to Dunton et al

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Art Unit: 2859

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mirellys Jagan whose telephone number is 571-272-2247. The examiner can normally be reached on Monday-Friday from 11AM to 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJ  
June 29, 2005



GAIL VERBITSKY  
PRIMARY EXAMINER